Polymer nanocomposites

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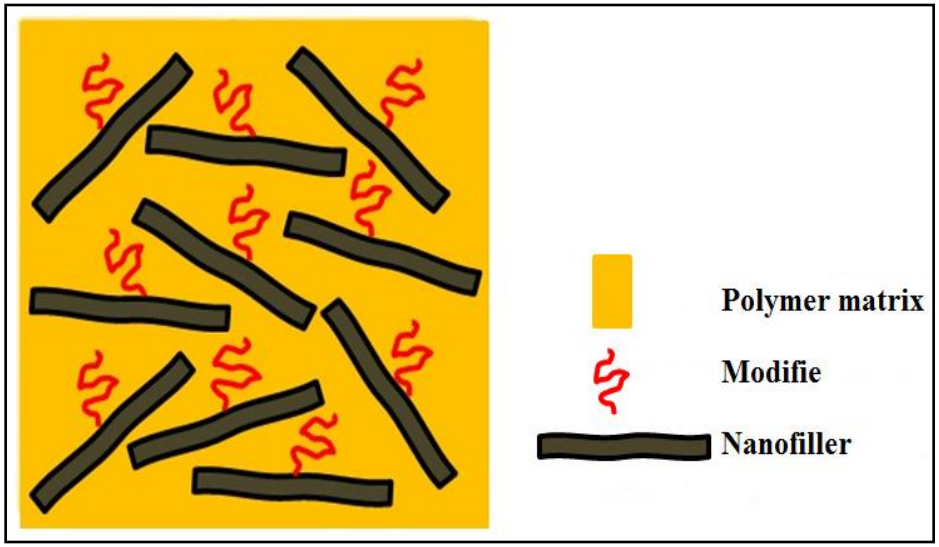
“Polymer nanocomposit are one of the important modern technologies for industrial applications due to its capability of producing better physical and chemical properties after the addition of low weight percentages of nano-fillers in the polymer matrix.

The majority of polymer nanocomposit systems include the three main components which are the polymer matrix, nanoparticles and organic modifier.

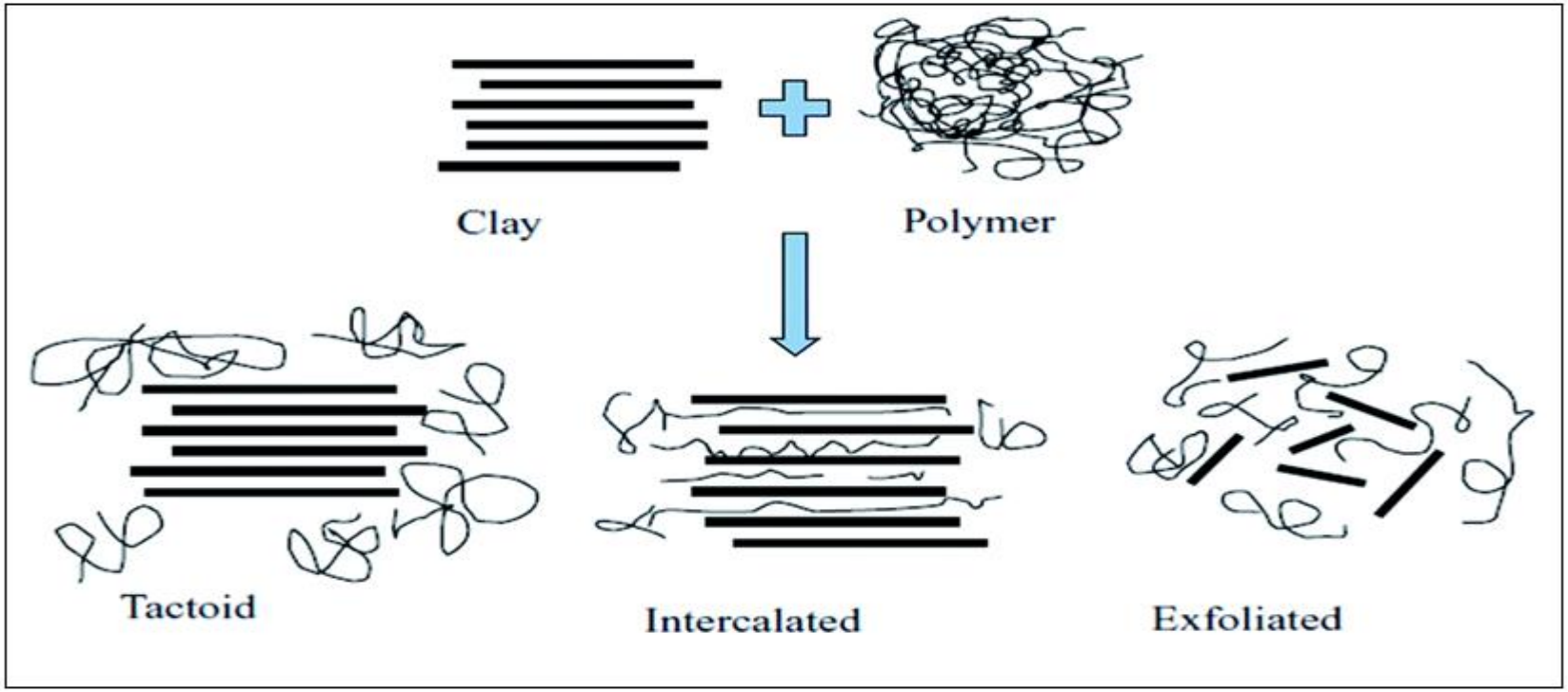


Advantages of Nanofluids

The advantage of polymer nanocomposite offer the potential for enhanced mechanical properties, barrier properties, thermal properties and flame retardant properties when compared to conventionally composite. Therefore, nanocomposites promise new applications in many fields such as mechanically-reinforced lightweight components, non-linear optics, battery cathodes and Ionics, nanowires, sensors and numerous other systems. Due to the higher surface area available with nanofillers, polymer nanocomposites.

STRUCTURE OF POLYMER NANOCOMPOSITES

- **The three steps required in this process is the initial surface wetting of filler tactoids by polymer molecules, after which there is an intercalation or infiltration of polymer into nanofiller galleries, and finally the exfoliation of nano-fillers into the polymer matrix.**



Structure of polymer nanocomposite

a

Separated

b

Intercalated

c

Exfoliated

PREPARATION METHODS OF POLYMER NANOCOMPOSITES

In general, there are three preparation methods widely used to synthesize polymer nanocomposit:

1-Solution Intercalation:

A solvent is employed in solution intercalation, resulting in the simultaneous dispersion of nanoparticles and dissolvent of organic polymer matrix in the same solvent.

2- Melt Intercalation:

The melt intercalation technique is considered in nanocomposite synthesis. To achieve well dispersion, sheer force mixing and high temperatures are employed to disperse fillers into a polymer matrix.

3- In Situ Polymerization:

The in-situ polymerization technique is widely applied due to a number of advantages, such as ease of handling and high performance for the final products' properties. This method is often favoured due to more control on the nanocomposite dispersion obtained.